[Name of Document] SPECIFICATION

[Title of the Invention] WIRELESS COMMUNICATION BASE STATION

[What is claimed is]

[Claim 1]

A wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the wireless communication base station comprises:

notification signal receiving means for receiving a notification signal including a system identification code from another base station; and

setting means for setting a system identification code for identifying a wireless communication network controlled by the wireless base station, based on the system identification code included in the notification signal received by said notification signal receiving means.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a technique for constructing one of mutually independent wireless communication networks where system identification codes are independently assigned on a network-by-

network basis.

[0002]

[Prior Art]

Conventionally, there has been known a wireless communication base station that, together with one or more communication terminal devices, constructs one of independent wireless communication networks, using one of system identification codes set on a network-by-network basis for each of wireless communication networks. When the base station sets various parameters for wireless communication, the state of usage of wireless communication networks in the periphery is grasped and a user or a network administrator manually sets the system identification code.

[0003]

There has been also known a system, such as a conventional wireless base station disclosed by the following patent document 1, that determines and automatically sets channels used for wireless communication based on the state of the periphery thereof.

[0004]

[patent document 1] Japanese Laid-Open Patent Publication (Kokai) No. 2000-111575

[0005]

[Problems to Be Solved by the Invention]

However, in the conventional wireless communication base station mentioned above, the setting of the system identification code is based on only determination made by the user or network administrator. This means that through carelessness, for example, there are cases where a system identification code that is identical to a system identification code used by another wireless communication network, which is in activity in a range where communication cells controlled by these base stations overlap is erroneously set for the present base station. In such case, there is the risk of the mutual independence of the wireless communication networks not being ensured.

[0006]

Further, although the system disclosed by the patent document 1 mentioned above can automatically set channels, it has not been possible to automatically set a system identification code for identifying a wireless communication network to which the wireless base station belongs.

[0007]

The present invention is invented for solving the problems of the prior art described above. It is an object of the present invention to ensure the mutual independence of wireless communication networks with overlapping communication cells.

[0008]

[Means for Solving the Problems]

To attain the above objects, a wireless communication base station according to the present invention that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, is characterized in that the wireless communication base station comprises notification signal receiving means for recognizing receiving a notification signal including a system identification code used by from another wireless base station, and setting means for setting a system identification code for identifying a wireless communication network controlled by used by the wireless base station, based on the system identification code included in the notification signal received by the notification signal receiving means.

[0009]

[Embodiments]

The present invention will now be described in detail with reference to the accompanying drawings showing preferred embodiments thereof.

[0010]

(First Embodiment)

FIG. 1 is a schematic diagram showing the overall construction of a wireless communication network comprised of wireless communication base stations

according to a first embodiment of the present invention. This wireless communication network is constructed according to the wireless LAN standard (IEEE 802.11 b).

[0011]

In FIG. 1, an access point WDS_AP is in charge of connecting a wireless wide area network connecting system WDS (Wireless Distribution System) and a DS (Distribution System) 4 that is a backbone LAN. As multifunction access points MF_AP, there are multifunction access points MF_AP1 and MF_AP2. Reference numeral 10 designates a wireless cell that is controlled by the access point WDS_AP. Reference numeral 11 designates a controlled wireless cell of the multifunction access point MF_AP1.

[0012]

In the present embodiment, a description will be given of an example of an automatic system identification code setting method in which a multifunction access point MF_AP that forms a new wireless communication cell automatically sets a system identification code SSID under an environment where the wireless LAN standard (IEEE 802.11 b) is used for wireless communication networks and the wireless wide area network connecting system WDS is connected to the backbone LAN DS 4. In this example, it is assumed that the multifunction access point MF_AP1 is already active

and the multifunction access point MF_AP2 is about to be activated inside the controlled wireless cell 11 of the multifunction access point MF_AP1.

[0013]

FIG. 2 is a block diagram showing the arrangement of functions of multifunction access points MF_AP. The respective access points in the multifunction access points MF_AP have the identical construction.

[0014]

Reference numerals 20(1) to 20(n) designate wireless LAN units (1 to n) for controlling communication cells respectively (notification signal transmitting means, notification signal receiving means). At least one wireless LAN unit is provided. Reference numerals 211 and 212 designate switch controllers that are in charge of connecting to a data bus 216. Connected via the data bus 216 to a CPU 213 (identification code generating means, identity determining means, identification code setting means) are a ROM 214, which stores a control program, and a RAM 215. Reference numeral 221 designates a wireless LAN unit for connecting to the WDS, and reference numeral 222 designates a wired LAN unit used when directly connecting to a DS without communicating via the WDS. When the WDS is not used, the wireless LAN unit 221 does not need to be provided.

[0015]

FIG. 3 is a diagram showing how an SSID information acquisition process is executed through passive scan by multifunction access point. FIG. 4 is a flowchart showing the SSID information acquisition process achieved by passive scan carried out by multifunction access point MF_AP. In particular, this process illustrates the case where on being activated, the multifunction access point MF_AP2 grasps an SSID from beacons (notification signal) transmitted from the multifunction access point MF_AP1 so as to avoid duplicated setting of the SSID.

[0016]

First, in FIG. 4, when the multifunction access point MF_AP2 is to be newly activated, it is determined whether the wireless LAN unit 221 for connecting to the WDS has been mounted (step S401). When it is determined that the wireless LAN unit 221 has been mounted, a station STA (terminal) mode is set for the wireless LAN unit 221 (step S402), and the process proceeds to a step S404. On the other hand, when it is determined that the wireless LAN unit 221 has not been mounted, a station STA (terminal) mode is set for one of the wireless LAN units 20(1) to 20(n) (step S403), and the process proceeds to the step S404. At least one wireless LAN units are connected for controlling the wireless cell.

[0017]

In the step S404, SSID information that is being used in the periphery (i.e. inside the range of the wireless communication cell of the multifunction access point MF_AP2) is gathered by carrying out passive scan. In other words, all channels that can be used by the multifunction access point MF_AP2 are each received for a stipulated time period (a time period that is no shorter than a maximum transmission interval for beacons as stipulated by infrastructure mode of IEEE 802.11 Standard). SSIDs included in the received beacons are thus acquired.

[0018]

This will be explained with reference to FIG. 3. First, the multifunction access point MF_AP1, which is in activity in the periphery, uses channel ch4 to intermittently transmit beacons (301 to 304...) that include an SSID that is the system identification code. In this state, the multifunction access point MF_AP2 that is about to be activated inside the controlled wireless cell 11 of the multifunction access point MF_AP1 receives beacons for a predetermined time period on each of respective channels starting with channel ch1 (311). When no beacon is detected, the beacon receiving operation is carried out on the next channel. In the illustrated example, when channel ch4 is being received, beacons (303, 304) intermittently transmitted by the multifunction access point MF_AP1 are received

(312). The multifunction access point MF_AP2 extracts an SSID that is being used by the multifunction access point MF_AP1 and is included in the received beacons, and so acquires the SSID.

[0019]

Referring again to FIG. 4, next in a step S405, an SSID for the cell controlled by the multifunction access point MF_AP2 is automatically generated for use by the wireless LAN unit 20. The automatically generated SSID is intended for subsequent use. It is then determined whether the generated SSID is identical with the acquired SSID that is in use in the periphery of the present base station (step S406).

[0020]

When it is determined that the SSIDs do not match, the automatically generated SSID is set as the SSID of the wireless cell controlled by the present base station (that is, as an SSID for identifying the wireless communication network controlled by the present base station), the multifunction access point MF_AP2 is activated (step S407), and the present process is terminated. In this way, duplicated setting of an SSID can be avoided.

[0021]

On the other hand, when the automatically generated SSID is identical with the acquired SSID mentioned above, the process returns to the step S404

and the collecting process for another peripheral SSID and the automatic regeneration of an SSID, etc., is repeated.

[0022]

It should be noted that in the step S405 above, when an SSID is automatically regenerated, a predetermined generation algorithm that produces a different value for a regenerated SSID to the preceding value, such as by adding a number of regeneration iterations or the like to parameters for automatic generation, is used. By doing so, the automatic regeneration algorithm can be prevented from entering an infinite loop.

[0023]

According to the present embodiment, in a range where wireless cells overlap, duplicated of an SSID for respective wireless communication networks can be automatically detected. Further, an automatic generation algorithm that does not output the same result as before is used when SSID is regenerated, so that, a SSID different to SSIDs that are being used by wireless communication networks which are in activity in the periphery of the present base station can be automatically set without having to make the user especially conscious of the operation. Further, the mutual independence of wireless communication networks with overlapping wireless communication cells can be

ensured easily, and the mutual independence of wireless communication networks with overlapping communication cells can be ensured easily. As a result, the mutual independence of wireless communication networks with overlapping communication cells can be ensured easily.

[0024]

(Second Embodiment)

Next, a second embodiment of the present invention will be described with reference to FIG. 2 and FIGS. 4 to 7.

[0025]

FIG. 5 is a schematic diagram showing the overall construction of a wireless communication network comprised of wireless communication base stations according to the second embodiment of the present invention. This wireless communication network is constructed according to the wireless LAN standard (IEEE 802.11 b). In FIG. 5, component elements corresponding to those of the first embodiment are designated by identical reference numerals. Reference numeral 12 designates a expected controlled wireless communication cell when the multifunction access point MF_AP2 is activated.

[0026]

In the present embodiment, it is assumed that the multifunction access point MF_AP1 is already active and the multifunction access point MF_AP2 is about to be

activated not inside the controlled wireless cell 11 of the multifunction access point MF_AP1 but outside the controlled wireless cell 11. Also, a wireless LAN station STA1 (a communication terminal device) is assumed to be present inside both the expected controlled wireless cell 12 and the controlled wireless cell 11, and to be communicating with the multifunction access point MF_AP in infrastructure mode using channel ch4.

[0027]

In the state shown in FIG. 5, that is, when the multifunction access point MF_AP1 is active and the multifunction access point MF_AP2 is yet to be activated, if the multifunction access point MF_AP2 is to automatically set an SSID through only an SSID information acquisition process achieved by passive scan as was described in the first embodiment, it is possible to receive beacons transmitted from the multifunction access point MF_AP1 since the multifunction access point MF_AP2 is outside the controlled wireless cell 11. Accordingly, there is the possibility of the multifunction access point MF_AP2 automatically setting the same SSID as the multifunction access point MF_AP1.

[0028]

In addition, the wireless LAN station STA1 is present in an overlapping part of the expected

controlled wireless cell 12 and the controlled wireless cell 11. This means, for example, that even though the wireless LAN station STA1 should basically be able to access only the wireless communication network of the multifunction access point MF_AP1, there is the possibility of the wireless LAN station STA1 be able to access only an unexpected wireless communication network, such as a wireless communication network of the multifunction access point MF_AP2.

[0029]

In the second embodiment, the above situation is remedied by using an automatic setting process for the SSID, which uses the results of active scan, in addition to the automatic setting of the SSID by the SSID information acquisition process achieved by passive scan as described for the first embodiment.

[0030]

FIG. 6 is a diagram showing how an SSID information acquisition process is executed through active scan by the multifunction access points MF_AP. FIG. 7 is a flowchart showing the SSID information acquisition process executed through passive scans by the multifunction access points MF_AP. In particular, this process illustrates the case where the multifunction access point MF_AP2 automatically sets an SSID by carrying out passive scan and then automatically sets the SSID as necessary by carrying

out active scan so as to avoid duplicated setting of the SSID.

[0031]

First, in a step S701 of FIG. 7, the same process as in the steps S401 to S406 of FIG. 4 is carried out. When the result of the determination in the step S406 is that the SSID automatically generated in the step S405 is not identical with the SSID acquired in the step S404, the SSID that has been generated at this time is set as an SSID for use from now onwards.

[0032]

Next, an unsearched channel (that is, a channel on which a probe request frame, described later, has not been transmitted) is selected for monitoring out of the channels that can be used by the multifunction access point MF_AP2 (step S702). After this, an active scan is carried out to collect information on an SSID that is being used in the periphery (that is, in a range of the communication cell of the multifunction access point MF_AP2)(step S703). That is, probe request frames are continuously transmitted for a stipulated time period on the monitored channel mentioned above. The SSID included in a probe response frame sent in response is then acquired.

[0033]

This will be explained with reference to FIG. 6. First, the multifunction access point MF_AP1, which is

being active in the periphery, uses channel ch4 to intermittently transmit beacons (301, 302, ...) that include an SSID.

[0034]

In this state, the wireless LAN station STA1 repeatedly carries out an operation of receiving a beacon in a beacon reception time period 601 that is stipulated by the infrastructure mode of IEEE 802.11 Standard and interrupts the receiving during a battery save time period 602 that is also stipulated by the infrastructure mode. The SSID used by the wireless LAN station STA1 is assumed to be "○△X".

[0035]

On the other hand, the multifunction access point MF_AP2 that is about to be newly activated outside the controlled wireless cell 11 continuously transmits probe request frames on the channel (such as channel ch1 at first) selected for monitoring, for the stipulated time period (the sum of the beacon reception time period 601 and the battery save time period 602 mentioned above) at stipulated minimum intervals (DIFS) between frames (61(1) to 61(n), 62(1) to 62(n)). In the illustrated example, the probe request frames are frames in which the same value "○△X" as the SSID used by the wireless LAN station STA1 is set.

[0036]

Next, monitoring is performed for a probe response

frame sent in response to the probe request frames. If the probe response frames does not be detected, monitoring is performed for the probe response frame on the next channel.

[0037]

In the illustrated example, the wireless LAN station STA1 is communicating with the multifunction access point MF_AP1 using channel ch4, so that a probe request frame is transmitted to a the present network group (the same SSID) for the first time when a probe request frame is transmitted on channel ch4. In this case, after the lapse of a minimum stipulated time period SIFS (SIFS≪DIFS) for responding, the wireless LAN station STA1 returns a probe response frame (a frame whose SSID is set at "OΔx")(630).

[0038]

It should be noted that since the multifunction access point MF_AP2 carries out carrier sense for at least the DIFS time period during continuous transmission, the multifunction access point MF_AP2 can receive the probe response frame (630) returned from the wireless LAN station STA1 after the lapse of the time period SIFS, even during the continuous transmission of probe request frames.

[0039]

The multifunction access point MF_AP2 receives the probe response frame and acquires the SSID in the probe

response frame. From the acquired SSID, it is recognized that there is a wireless LAN station that has the same SSID set thereto in the periphery of the present base station, and so it is recognized that the SSID that has been automatically generated for the present base station is set in duplication.

[0040]

Returning to FIG. 7, it is determined whether the automatically generated SSID is identical with the SSID acquired from the probe response frame (step S704). When this determination finds that SSIDs are identical with each other, the process returns to the step S701 and the passive scan and active scan process is repeated.

[0041]

On the other hand, when the automatically generated SSID is not identical with the SSID acquired from the probe response frame, it is determined whether the active scan has been completed for all the channels that can be used (step S705). As a result of this determination, when the active scan has not been completed for all the channels, the process returns to step S702 and the active scan process is repeated for the channel or channels. On the other hand, when the active scan has been completed for all the channels, the automatically generated SSID is set as the SSID of the wireless cell controlled by the present base

station, and the multifunction access point MF_AP2 is activated (step S706), followed by the present process is terminated.

[0042]

According to the present embodiment, even in the case where the multifunction access point MF_AP2 is newly activated outside the controlled wireless cell 11 of the multifunction access point MF_AP1, active scan is carried out so as to receive a probe response frame from the wireless LAN station STA1 present in both the controlled wireless cell 10 and the controlled wireless cell 11, which makes it possible to know duplicated setting of the SSID. When the SSID is set in duplication, such duplication can be avoided by repeating the process starting from the passive scan. As a result, compared with the first embodiment, the duplication of the SSID can be automatically detected with higher accuracy, and the mutual independence of wireless communication networks with overlapping communication cell s can be easily ensured, even when a wireless communication base station is located outside the communication cell of another wireless communication base station.

[0043]

It should be noted that although in the first and second embodiments described above, the SSIDs used by the wireless LAN units 20 are automatically generated,

the present invention is not limited to the automatic generation and a construction where an SSID is manually set by the user. In this case, when the result of the determination in the step S406 in FIG. 4 is that the generated SSID is identical with the acquired SSID which is used in the periphery of the present base station, it is preferable to warn the user using a predetermined warning message and to display the SSID set in duplication so as to urge the user to input a different SSID. By doing so, the SSID duplication detection can be applied to a validity checking process when the system identification code (SSIDs) is changed (customized) by the user.

[0044]

It should be noted that although the above described SSID information acquisition process using passive scan in FIG. 4 (or the step S701 of FIG. 7) is carried out when a multifunction access point MF_AP is activated, the present invention is not limited to this timing and the SSID information acquisition process may be carried out during an automatic or manual changing operation for the SSID, for example.

[0045]

It should be noted that although a wireless LAN (a system based on IEEE 802.11 Standard) is employed as a wireless communication medium, the present invention can be effectively applied to any other wireless

communication medium (such as a cordless telephone system) that includes system identification codes.

[0046]

It should be noted that although in the first and second embodiments, the case where there are two multifunction access points MF_AP and one wireless LAN station STA1 is illustrated above, the present invention can be applied in the same way to other cases where more devices or apparatuses are involved.

[0047]

It is to be understood that the object of the present invention may also be accomplished by supplying a system or an apparatus with a storage medium in which a program code of software which realizes the functions of either of the above described embodiments is stored, and causing a computer (or CPU or MPU) of the system or apparatus to read out and execute the program code stored in the storage medium.

[0048]

In this case, the program code itself read out from the storage medium realizes the functions of either of the embodiments described above, and hence the storage medium in which the program code is stored constitutes the present invention.

[0049]

Examples of the storage medium for supplying the program code include a floppy (registered trademark)

disk, a hard disk, a magneto-optical disk, a CD-ROM, a CD-R, a CD-RW, a DVD-ROM, a DVD-RAM, a DVD-RW, a DVD+RW, a magnetic tape, a nonvolatile memory card, and a ROM.

[0050]

Further, it is to be understood that the functions of either of the above described embodiments may be accomplished not only by executing a program code read out by a computer, but also by causing an OS (operating system) or the like which operates on the computer to perform a part or all of the actual operations based on instructions of the program code.

[0051]

Further, it is to be understood that the functions of either of the above described embodiments may be accomplished by writing a program code read out from the storage medium, into a memory provided on an expansion board inserted into a computer or in an expansion unit connected to the computer and then causing a CPU or the like provided in the expansion board or the expansion unit to perform a part or all of the actual operations based on instructions of the program code.

[0052]

Although the present invention has been described with reference to various examples and embodiments, it should be obvious to those skilled in the art that the object and scope of the present invention are not

limited to the description of or the drawings referred to by this specification and that various changes and modifications can be made as described in the appended claims.

[0053]

Illustrative Embodiments of the present invention are listed below.

[0054]

(Illustrative Embodiment 1) A wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the wireless communication base station comprises: notification signal transmitting means for transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving means for receiving a notification signal including a system identification code from another base station; identification code generating means for generating a system identification code to be used by the wireless communication base station; identity determining means for determining whether the system identification code included in the notification signal received by the notification signal

receiving means is identical with the system identification code generated by the identification code generating means; and identification code setting means for setting the system identification code generated by the dentification code generating means as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined by the identity determining means, wherein if the identity is determined by the identity determining means, the identification code generating means generates a system identification different to the system identification code previously generated as a system identification code to be used.

[0055]

(Illustrative Embodiment 2) A wireless base station according to illustrative embodiment 1, characterized in that the wireless communication base station comprises: means for transmitting a request signal on channels that can be used by for which the system identification code to be used is set, detecting whether the system identification code as a response signal to the request signal is received, and recognizing whether the system identification code is identical with system identification codes used in the periphery; and identification code setting means for setting the system identification code generated by the

identification code generating means as a system identification code for identifying the wireless communication network controlled by the wireless communication base station if the identity is not determined by the identity determining means, wherein if the identity is determined by the identity determining means, the identification code generating means generates a system identification code different to the system identification code previously generated as a system identification code to be used.

[0056]

(Illustrative Embodiment 3) A wireless base station according to illustrative embodiment 1 or 2, characterized in that the identification code generating means generates the system identification code when the wireless base station is newly activated, and the system identification code to be used to be set is automatically generated using a predetermined algorithm in the wireless base station.

(Illustrative Embodiment 4) A wireless base station according to illustrative embodiment 3, characterized in that the predetermined algorithm includes an algorithm that produces a different value to the system identification code previously generated.

[0057]

(Illustrative Embodiment 5) A wireless base station according to illustrative embodiment 1 or 2,

characterized in that the identification code generating means generates the system identification code when changing operation for the system identification code is carried out.

[0058]

(Illustrative Embodiment 6) A wireless base station according to any of illustrative embodiments 1 to 5, characterized in that a wireless LAN system based on IEEE 802.11 Standard is employed as a wireless communication medium, and SSID is employed as a system identification code.

[0059]

(Illustrative Embodiment 7) A wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the wireless communication base station comprises: notification signal transmitting means for transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving means for receiving a notification signal including a system identification code from another base station; identification code generating means for generating a system identification

code to be used by the wireless communication base station; first identity determining means for determining whether the system identification code included in the notification signal received by the notification signal receiving means is identical with the system identification code generated by the identification code generating means; request signal transmitting means for transmitting a request signal for requesting a response signal if the identity is not determined by the first identity determining means; response signal receiving means for receiving the response signal including a system identification code transmitted by a communication terminal device for which the same system identification code is set response to the request signal transmitted by the request signal transmitting means; second identity determining means for determining whether the system identification code included in the response signal received by the response signal receiving means is identical with the system identification code generated by the identification code generating means; and identification code setting means for setting the system identification code generated by the identification code generating means as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not

determined by the second identity determining means, wherein if the identity is determined by at least one of the first identity determining means and the second identity determining means, the identification code generating means generates a system identification different to the system identification code previously generated as a system identification code to be used. According to the arrangement described above, the duplication of the SSID can be automatically detected with higher accuracy, and the mutual independence of wireless communication networks with overlapping wireless cell s can be easily ensured, even when a wireless base station is located outside the wireless cell of another wireless base station.

[0060]

(Illustrative Embodiment 8) A wireless base station according to illustrative embodiments 7, characterized that the request signal transmitting means transmits the request signal on all the channels that can be used by the wireless communication base station.

[0061]

(Illustrative Embodiment 9) A wireless base station according to illustrative embodiments 7 or 8, characterized that the notification signal receiving means for receives the notification signal on all the channels that can be used by the wireless communication

base station.

[0062]

(Illustrative Embodiment 10) A wireless base station according to any of illustrative embodiments 1, and 7 to 9, characterized that the identification code generating means carries out the first generation of the system identification code when the wireless base station is newly activated and/or when changing operation for the system identification code is carried out.

[0063]

(Illustrative Embodiment 11) A wireless base station according to any of illustrative embodiments 7 to 10, characterized that the identification code generating means generates the system identification code automatically using a predetermined algorithm.

[0064]

(Illustrative Embodiment 12) A wireless base station according to any of illustrative embodiments 7 to 11, characterized that by the identification code generating means the system identification code manually set by a user, and if the identity is determined by at least one of the first identity determining means and the second identity determining means, duplicated generating of the system identification code is avoided using a predetermined warning message.

[0065]

(Illustrative Embodiment 13) A wireless base station according to any of illustrative embodiments 1, and 7 to 12, characterized that the wireless communication network is constructed according to the wireless standard IEEE Std 802.11. , and SSID is employed as a system identification code.

[0066]

(Illustrative Embodiment 14) A control method of controlling a wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the control method comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving step of receiving a notification signal including a system identification code from another base station; identification code generating step of generating a system identification code to be used by the wireless communication base station; identity determining step of determining whether the system identification code included in the notification signal received in the notification signal receiving

step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code generated in the identification code generating step as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined in the identity determining step, wherein if the identity is determined in the identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0067]

(Illustrative Embodiment 15) A control method of controlling a wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the control method comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving step of receiving a notification

signal including a system identification code from another base station; identification code generating step of generating a system identification code to be used by the wireless communication base station; first identity determining step of determining whether the system identification code included in the notification signal received in the notification signal receiving step is identical with the system identification code generated in the identification code generating step; request signal transmitting step of transmitting a request signal for requesting a response signal if the identity is not determined in the first identity determining step; response signal receiving step of receiving the response signal including a system identification code transmitted by a communication terminal decive for which the same system identification code is set response to the request signal transmitted in the request signal transmitting step; second identity determining step of determining whether the system identification code included in the response signal received in the response signal receiving step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code generated in the identification code generating step as a system identification code for identify the wireless

communication network controlled by the wireless communication base station if the identity is not determined in the second identity determining step, wherein if the identity is determined in at least one of the first identity determining step and the second identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0068]

(Illustrative Embodiment 16) A control program for causing a computer to control a wireless base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the control program comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving step of receiving a notification signal including a system identification code from another base station; identification code generating step of generating a system identification code to be used by the wireless communication base station; identity determining step of determining whether the

system identification code included in the notification signal received in the notification signal receiving step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code generated in the identification code generating step as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined in the identity determining step, wherein if the identity is determined in the identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0069]

(Illustrative Embodiment 17) A control program for causing a computer to control a wireless base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the control program comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the

wireless communication base station; notification signal receiving step of receiving a notification signal including a system identification code from another base station; identification code generating step of generating a system identification code to be used by the wireless communication base station; first identity determining step of determining whether the system identification code included in the notification signal received in the notification signal receiving step is identical with the system identification code generated in the identification code generating step; request signal transmitting step of transmitting a request signal for requesting a response signal if the identity is not determined in the first identity determining step; response signal receiving step of receiving the response signal including a system identification code transmitted by a communication terminal device for which the same system identification code is set response to the request signal transmitted in the request signal transmitting step; second identity determining step of determining whether the system identification code included in the response signal received in the response signal receiving step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code

generated in the identification code generating step as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined in the second identity determining step, wherein if the identity is determined in at least one of the first identity determining step and the second identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0070]

(Illustrative Embodiment 18) A computer-readable storage medium storing a control program for causing a computer to control a wireless base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the control program comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving step of receiving a notification signal including a system identification code from another base station; identification code generating

step of generating a system identification code to be used by the wireless communication base station; identity determining step of determining whether the system identification code included in the notification signal received in the notification signal receiving step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code generated in the identification code generating step as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined in the identity determining step, wherein if the identity is determined in the identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0071]

(Illustrative Embodiment 19) A computer-readable storage medium storing a control program for causing a computer to control a wireless base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the

control program comprises: notification signal transmitting step of transmitting a notification signal including a system identification code set for the wireless communication network controlled by the wireless communication base station; notification signal receiving step of receiving a notification signal including a system identification code from another base station; identification code generating step of generating a system identification code to be used by the wireless communication base station; first identity determining step of determining whether the system identification code included in the notification signal received in the notification signal receiving step is identical with the system identification code generated in the identification code generating step; request signal transmitting step of transmitting a request signal for requesting a response signal if the identity is not determined in the first identity determining step; response signal receiving step of receiving the response signal including a system identification code transmitted by a communication terminal device for which the same system identification code is set response to the request signal transmitted in the request signal transmitting step; second identity determining step of determining whether the system identification code included in the response signal received in the response signal

receiving step is identical with the system identification code generated in the identification code generating step; and identification code setting step of setting the system identification code generated in the identification code generating step as a system identification code for identify the wireless communication network controlled by the wireless communication base station if the identity is not determined in the second identity determining step, wherein if the identity is determined in at least one of the first identity determining step and the second identity determining step, in the identification code generating step, a system identification different to the system identification code previously generated as a system identification code to be used is generated.

[0072]

(Illustrative Embodiment 20) A wireless communication base station that constructs an independent wireless communication network with communication terminal devices using a system identification code set for each of wireless communication networks, characterized in that the wireless communication base station comprises: notification signal receiving means for receiving a notification signal including a system identification code from another base station; and setting means for setting the system identification code generated by the

identification code for identifying a wireless communication network controlled by the wireless base station based on the the system identification code included in the notification signal received by the notification signal receiving means.

[0073]

[Effects of the Invention]

As described above, according to the present invention, the mutual independence of wireless communication networks with overlapping communication cells can be ensured easily.

[0073]

[Brief Description of the Drawings]

[FIG. 1]

FIG. 1 is a schematic diagram showing the overall construction of a wireless communication network comprised of wireless communication base stations according to a first embodiment of the present invention.

[FIG. 2]

FIG. 2 is a block diagram showing the arrangement of functions of one of multifunction access points.

[FIG. 3]

FIG. 3 is a diagram showing how an SSID information acquisition process is executed through passive scan by the multifunction access points, according to the first embodiment.

[FIG. 4]

FIG. 4 is a flowchart showing the SSID information acquisition process executed through passive scan by the multifunction access points.

[FIG. 5]

FIG. 5 is a schematic diagram showing the overall construction of a wireless communication network comprised of wireless communication base stations according to a second embodiment of the present invention.

[FIG. 6]

FIG. 6 is a diagram showing how an SSID information acquisition process is executed through active scan by the multifunction access points, according to the second embodiment.

[FIG. 7]

FIG. 7 is a flowchart showing the SSID information acquisition process executed through passive scan by the multifunction access points.

[Description of Reference Numerals]

20(1)-20(n): wireless LAN units (notification signal transmitting means, notification signal receiving means, response signal receiving means)

213: CPU (identification code generating means, identity determining means, first identity determining means, identification code setting means, second identity determining means)

221: wireless LAN units (notification signal transmitting means, notification signal receiving means, response signal receiving means)

222: wired LAN unit

MF_AP1, MF_AP2: multifunction access points (wireless communication base station).

STA1: wireless LAN station (communication terminal device)

WDS_AP: access point